

Appl. No. : 10/022,297
Filed : December 12, 2001

REMARKS

Claims 1-32 were originally pending in the present application. Claims 27-32 were canceled in response to a restriction requirement. Thus, Claims 1-26 were subject to examination as reported in the September 12, 2002 Office Action. The proposed drawing correction, the amendments to the specification and the claims, and the following remarks are responsive to the September 12, 2002 Office Action.

Claims 2 and 3 are canceled herein. Thus, Claims 1 and 4-26 remain pending for further consideration by the Examiner.

Response to Requirement for a New Oath or Declaration

In section 2 of the Office Action, the Examiner states that the oath or declaration is defective and requires a new oath or declaration in compliance with 37 C.F. 1.67(a) that identifies the application by application number and filing date. In particular, the Examiner states that the oath or declaration is defective because non-initialed and/or non-dated alterations have been made in the oath or declaration (citing 37 C.F.R. § 1.52(c)).

Applicants do not understand the basis for the Examiner's statement. In particular, the only apparent "alteration" to the declaration is the correction of the spelling of Koji Morita's printed name above Mr. Morita's signature and above the date of his signature. Applicants respectfully submit that separate "initialling" and dating of the corrected spelling of Mr. Morita's name is unnecessary because Mr. Morita signed and dated the declaration proximate the correction. Thus, Mr. Morita's correction complies with 37 C.F.R. § 1.52(c)(1), which states in pertinent part:

(c)(1) Any interlineation, erasure, cancellation or other alteration of the application papers filed must be made before the signing of the accompanying oath or declaration . . . and should be dated and initialed or signed by the applicant on the same sheet of paper.

Mr. Morita has satisfied that requirement by signing his name and dating his signature below the alteration in question.

Appl. No. : 10/022,297
Filed : December 12, 2001

Although a new oath or declaration is not required, Applicants will submit a new declaration if the Examiner maintains the objection in the next official communication.

Response to Objections to the Drawings in Section 3 of the Office Action

In section 3 of the Office Action, the Examiner objects to the drawings as failing to comply with 37 C.F.R. § 1.84(p)(5) because reference signs in Figures 4, 6, 7, 8, 9, 15 and 22 are not mentioned in the specification. As discussed below, Applicants respectfully traverse the objections as to certain reference signs that are shown in the specification. As further discussed below, Applicants have corrected the drawings or amended the specification as to other reference signs where the drawings and the specification are inconsistent.

Section 3(a) Reference signs 78, 103b and 103c in Figure 4

The reference sign 78 is explicitly mentioned on page 7 in paragraph [0045].

The Examiner's objections to the reference signs 103B and 103C are apparently the result of typographical errors in paragraphs [0047] and [0049] in which Figure 4 is inadvertently identified as Figure 5. Applicants have amended paragraphs [0047] and [0049] of the specification to correct the obvious typographical errors. The amended specification explicitly refers to the reference signs 103B (last line of paragraph [0047]) and 103C (third line of paragraph [0049]) with respect to Figure 4. No new matter is introduced by the amendment to the specification.

Applicants respectfully request the Examiner to withdraw the objections to Figure 4 in view of the foregoing discussion regarding the reference sign 78 and in view of the amendment to the specification.

Section 3(b) Reference signs 74, 106A and 88 in Figure 6

In the accompanying *Request for Approval of Drawing Changes*, the reference sign 74 is deleted from Figure 6. No new matter is introduced by the drawing change.

Appl. No. : 10/022,297
Filed : December 12, 2001

In paragraph [0048] of the specification, the capacitor terminals 106A and 106B are described together as a pair of capacitor terminals 106. Applicants have amended paragraph [0048] to explicitly refer to the pair of terminals 106A, 106B to overcome the Examiner's objection. No new matter is introduced by the amendment to the specification.

The reference sign 88 is explicitly mentioned in the second line of paragraph [0048].

Applicants respectfully request the Examiner to withdraw the objections to Figure 6 in view of the deletion of the reference sign 74 from Figure 6, the amendment of the specification, and the foregoing discussion regarding the reference sign 88.

Section 3(c) Reference signs 98C, 100B and 100C in Figure 7

Paragraph [0047] of the specification includes the following statement that relates the similar elements of the terminal bar 62A and the terminal bar 62B:

Since the terminal bar 62B is similar to the terminal bar 62A except for its size and except for the positions of the apertures, the same reference numerals are assigned to corresponding portions of the terminal bar 62B but with the letter B.

Since the top section 100A is explicitly mentioned with respect to the terminal bar 62A, the foregoing sentence inherently mentions the top section 100B as the corresponding portion of the terminal bar 62B in Figure 7. In view of this statement, Applicants respectfully submit that it is not necessary to include the actual characters of the reference sign in the specification in order to enable a person skilled in the art to understand the description of the top section 100B in the specification.

Paragraph [0049] of the specification includes similar statements with respect to the relationship of the portions of the terminal bar 62C with respect to the portions of the terminal bar 62A and the terminal bar 62B:

Another terminal bar 62C, which is similar to the terminal bars 62A, 62B, is affixed to the printed wiring board 72 below the circuit board 88. Although the terminal bar 62C only has a nominal vertical section and no aperture is provided in the vertical section, the same reference numerals are assigned to the corresponding portions but with the letter C.

Appl. No. : 10/022,297

Filed : December 12, 2001

Since the top section 100A and the vertical section 98A are explicitly mentioned with respect to the terminal bar 62A, the foregoing sentences inherently mention the top section 100C and the vertical section 98C as the corresponding portions of the terminal bar 62C. In view of these statements, Applicants respectfully submit that it is not necessary to include the actual characters of the reference sign in the specification in order to enable a person skilled in the art to understand the description of the top section 100C and the vertical section 98C in the specification.

Applicants respectfully request the Examiner to withdraw the objections to Figure 7 in view of the foregoing discussion.

Section 3(d) Reference signs 108A and 108B in Figure 8

In paragraph [0048], the bolts 108A and 108B are described together as the two bolts 108. Applicants have amended paragraph [0048] to explicitly refer to the two bolts 108A, 108B to overcome the Examiner's objection. No new matter is introduced by the amendment to the specification.

Applicants respectfully request the Examiner to withdraw the objection to Figure 8 in view of the amendment and the foregoing discussion.

Section 3(e) Reference signs 96A and 102A in Figure 9

The reference sign 96A and the reference sign 102 are explicitly mentioned on page 7 in paragraph [0049].

Applicants respectfully request the Examiner to withdraw the objection to Figure 9 in view of the foregoing discussion.

Section 3(f) Reference sign 19 in Figure 15

The number 19 in Figure 15 is not a reference sign. Rather, the number 19 appears twice in Figure 15 proximate to the arrows indicating the plane upon which the sectional view of

Appl. No. : 10/022,297
Filed : December 12, 2001

Figure 19 is taken in accordance with 37 C.F.R. § 1.84(h)(3) as described on page 5 in paragraph [0032] as follows:

FIGURE 19 is a schematic, partial side view of the semiconductor device viewed from the line 19-19 in FIGURE 15.

Since the line 19-19 of Figure 15 is described in the brief description of the drawings, it is not necessary to describe the line again in the detailed description section of the specification.

Applicants respectfully request the Examiner to withdraw the objection to Figure 15 in view of the foregoing discussion.

Section 3(g) Reference sign S33 in Figure 22

Applicants have amended paragraph [0071] of the specification to correct an inadvertent typographical error in which the step S33 is incorrectly referred to as the second occurrence of the step S32. One skilled in the art will readily determine from the context that the description refers to the step S33. No new matter is introduced by the amendment to the specification.

Applicants respectfully request the Examiner to withdraw the objection to Figure 22 in view of the amendment and the foregoing discussion.

Response to Objection to the Drawings in Section 4 of the Office Action

In Section 4 of the Office Action, the Examiner objects to the drawings under 37 C.F.R. § 1.84(p)(4) because the reference character “72” has been used to designate both the printed wiring board and the substrate, and the Examiner refers to paragraph [0045] on page 6 as the basis for the objection. Applicants respectfully traverse the objection. As stated on page 6 in paragraph [0045]:

As used in the following description, the printed wiring board 72 may also be referred to as a metallic substrate or a substrate unless indicated otherwise or otherwise readily apparent from the context.

By the foregoing sentence, Applicants have explicitly informed a person skilled in the art that either term (“printed wiring board” or “substrate”) may be used to refer to the underlying board

Appl. No. : 10/022,297

Filed : December 12, 2001

onto which the other components are mounted. Applicants' use of the alternative terms for the same structure is in accordance with M.P.E.P. § 608.01(g):

An applicant is ordinarily permitted to use his or her own terminology, as long as it can be understood.

The Examiner has presented no reason why Applicants use of the two terms in the alternative cannot be understood by a person of skill in the art.

Applicants respectfully request the Examiner to withdraw the objection to the drawings under 37 C.F.R. § 1.84(p)(4) in view of the foregoing discussion.

Response to Objection to the Drawings in Section 5 of the Office Action

In Section 5 of the Office Action, the Examiner objects to the drawings under 37 C.F.R. § 1.84(p)(5) because the drawings do not include the reference signals mentioned in the specification. In particular, the Examiner states that the reference sign 104B in paragraph [0047] on page 8 of the specification is not in the drawings. The Examiner also states that the reference signs 106 and 108 in paragraph [0048] on page 8 of the specification are not in the drawings.

Applicants have amended paragraph [0047] the specification to remove the reference sign 104B. Thus, a drawing correction is not needed. No new matter is introduced by the amendment to the specification.

As discussed above in response to the objections in section 3(b) and section 3(d) of the Office Action, Applicants have amended paragraph [0048] of the specification to conform the specification to the drawings with respect to the reference signs 106A, 106B, 108A and 108B. Thus, the specification no longer includes the reference signs 106 and 108, and no drawing correction is required.

Applicants respectfully request the Examiner to withdraw the objections to the drawings under 37 C.F.R. § 1.84(p)(5) in view of the amendments to the specification and the foregoing discussion.

Appl. No. : 10/022,297

Filed : December 12, 2001

Response to the Requirement for a New Title in Section 6 of the Office Action

In Section 6 of the Office Action, the Examiner states that the title of the invention is not descriptive and requires a new title that is clearly indicative of the invention to which the claims are directed.

Applicants have replaced the original title with a new title in response to the Examiner's requirement. Applicants respectfully request the Examiner to withdraw the requirement in view of the new title.

Response to the Rejection of Claims 13 and 16-26 Under 35 U.S.C. § 112, Second Paragraph in Section 8 of the Office Action

In Section 8 of the Office Action, the Examiner rejects Claims 13 and 16-26 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicants respectfully traverse the rejection of Claims 13 and 16-26 for the reasons set forth below with respect to the specific bases for the rejections.

Applicants respectfully submit that the rejected claims definitely point out and distinctly claim the subject matter. Applicants further submit that the claims are fully supported by the specification in combination with Figures 15-19 of the drawings. Specific support for each claim is found in the specification and drawings as set forth below.

Section 8(a)

Support for "corners of the land generally confine the corners of the semiconductor chip" in Claim 13 is set forth in paragraph [0061] in connection with Figure 15:

In the illustrated arrangement, four corners or peaked portions of the semiconductor chip 66 are confined or trapped in the respective positioning corners 150 of the land pattern. That is, the corners 150 of the land 144 are disposed in close proximity to the corners of the semiconductor chip 66.

Appl. No. : 10/022,297

Filed : December 12, 2001

Section 8(b)

Support for “corners of the land generally confining the corners of the semiconductor chip” in Claim 16 is also set forth in the above-cited portion of paragraph [0061] in connection with Figure 15.

Section 8(c)

Support for “corners of the semiconductor chips are positioned on a diagonal line of the rectangular shape” in Claim 18 is set forth in paragraph [0064] in connection with Figure 16:

Two positioning corners 150 are made on a line 152 including one of the diagonal lines of the semiconductor chip 66 in this arrangement.

Section 8(d)

Support for “the corners of the land are the closest portions to the corners of the semiconductor chip” in Claim 17 is set forth in paragraph [0062] in connection with Figure 15:

The land pattern has four extended areas 154 along four sides of the semiconductor chip 66. In other words, the positioning corners 150 are the closest portions of the land 144 to the corners of the semiconductor chip 66.

Section 8(e)

Support for “rectangular shape except for the corners” in Claim 21 is provided by Figures 15 and 16, which show land patterns that are rectangular. For example, the differences between the corners and rest of the land pattern 144 in Figure 15 are set forth in paragraph [0062] as follows:

Further, the entire area of the land 144 is larger than the entire area of the semiconductor chip 66, and the area of the land 144 generally shrinks toward the corners of the semiconductor chip 66. Each extended area 154 in this pattern generally has a square configuration.

Appl. No. : 10/022,297
Filed : December 12, 2001

Section 8(f)

Support for "round shape except for the corners" in Claim 22 is provided by Figures 17 and 18, which show land patterns that have generally round shapes. For example, the pattern in Figure 18 is described in paragraph [0066] as follows:

This pattern has two positioning corners 150 similar to the pattern shown in FIGURE 16 but has a round shape or generally circular shape.

In view of the foregoing discussion, Applicants respectfully request the Examiner to withdraw the rejections of Claims 13 and 16-26 under 35 U.S.C. § 112, second paragraph.

Response to the Rejection of Claims 1, 2, 8-10 and 13 Under 35 U.S.C. § 103(a) in Section 10 of the Office Action

In Section 10 of the Office Action, the Examiner rejects Claims 1, 2, 8-10 and 13 under 35 U.S.C. § 103(a) as obvious over U.S. Patent No. 5,373,190 to Ichiyama in view of Japanese Patent No. JP406275942A to Sakuma.

Applicants have cancelled Claim 2 without prejudice and have amended Claims 1 and 8. Applicants respectfully traverse the rejection of amended Claims 1 and 8 and Claims 10 and 13 for the following reasons.

Claim 1

Amended Claim 1 recites a semiconductor device comprising a substrate and a land formed on the substrate. A semiconductor chip is mounted on the land. The semiconductor chip is joined with the land only through a solder layer. A synthetic resin covers the land, the solder layer and the semiconductor chip on the substrate. A coefficient of expansion of the synthetic resin is generally less than a coefficient of expansion of the substrate or a coefficient of expansion of the land.

Neither Ichiyama nor Sakuma discloses a coefficient of expansion of the synthetic resin that is generally less than a coefficient of expansion of the substrate or a coefficient of expansion of the land. Accordingly, the combination of Ichiyama and Sakuma does not teach or suggest a

Appl. No. : 10/022,297
Filed : December 12, 2001

coefficient of expansion of the synthetic resin being generally less than a coefficient of expansion of the substrate or a coefficient of expansion of the land.

The Examiner asserts, in connection with Claim 2, that the limitation of "a coefficient of expansion of the synthetic resin being generally less than a coefficient of expansion of the substrate or a coefficient of expansion of the land" makes Claim 2 a product-by-process claim. The Examiner further asserts that if the product in a product-by-process claim is the same as or is obvious from a product of the prior art, the claim is unpatentable even though the prior product is made by a different process. The limitations of Claim 2 are incorporated into amended Claim 1. Thus, Applicants respond to the Examiner's assertion regarding Claim 2 in the following discussion of amended Claim 1.

Applicants respectfully disagree with the Examiner's characterization of amended Claim 1 as a product-by-process claim. In particular, the limitation cited by the Examiner does not define a process. Rather, the cited limitation defines physical properties of the synthetic resin, the substrate and the land, which together define a combined structure that is patentably distinguished over the cited art. Applicants respectfully submit that amended Claim 1 is allowable, and Applicants respectfully request the Examiner to withdraw the rejection of amended Claim 1 under 35 U.S.C. § 103(a).

Claim 13

Claim 13 depends from Claim 1 and further defines the invention defined in Claim 1 with respect to the structure of the land. Claim 13 is patentably distinguished over the cited references for at least the reasons set forth above with respect to amended Claim 1. Claim 13 is further patentably distinguished over the cited references because Claim 13 defines the structure of the land in combination with the structure of amended Claim 1. Applicants respectfully submit that Claim 13 is allowable, and Applicants respectfully request the Examiner to withdraw the rejection of Claim 13 under 35 U.S.C. § 103(a).

Appl. No. : 10/022,297
Filed : December 12, 2001

Claim 8

Claim 8 originally depended from Claim 1. Claim 8 is amended herein as an independent claim that includes limitations from original Claim 1 and from original Claim 8. Amended Claim 8 recites a semiconductor device that comprises a substrate and a land formed on the substrate. A semiconductor chip is mounted on the land. The semiconductor chip is joined with the land only through a solder layer. A synthetic resin covers the land, the solder layer and the semiconductor chip on the substrate. The synthetic resin has a coefficient of expansion that is generally less than one of a coefficient of expansion of the substrate and a coefficient of expansion of the land. The coefficient of expansion of the synthetic resin is generally greater than the other one of the coefficient of expansion of the substrate and the coefficient of expansion of the land.

Neither Ichiyama nor Sakuma discloses a coefficient of expansion of the synthetic resin that is generally less than one of a coefficient of expansion of the substrate and a coefficient of expansion of the land and that is generally greater than the other one of the coefficient of expansion of the substrate and the coefficient of expansion of the land. Accordingly, the combination of Ichiyama and Sakuma does not teach or suggest a coefficient of expansion of the synthetic resin being generally less than one of a coefficient of expansion of the substrate and a coefficient of expansion of the land, and being generally greater than the other one of the coefficient of expansion of the substrate and the coefficient of expansion of the land, as defined in amended Claim 8.

The Examiner asserts that the limitation of "a coefficient of expansion of the synthetic resin being generally less than one of a coefficient of expansion of the substrate and a coefficient of expansion of the land, and being generally greater than the other one of the coefficient of expansion of the substrate and the coefficient of expansion of the land" makes Claim 8 a product-by-process claim.

Applicants respectfully disagree with the Examiner's characterization of amended Claim 8 as a product-by-process claim. In particular, the limitation cited by the Examiner does not define a process. Rather, the limitation defines physical properties of the synthetic resin, the

Appl. No. : 10/022,297

Filed : December 12, 2001

substrate and the land that together define a combined structure that is patentably distinguished over the cited references. Applicants respectfully submit that amended Claim 8 is allowable, and Applicants respectfully request the Examiner to withdraw the rejection of amended Claim 8 under 35 U.S.C. § 103(a).

Claim 9

Claim 9 depends from Claim 8 and further defines the coefficient of expansion of the synthetic resin as being less than the coefficient of expansion of the substrate and greater than the coefficient of expansion of the land. Claim 9 is patentably distinguished over the cited references for at least the reasons set forth above with respect to amended Claim 8. Claim 9 is further patentably distinguished over the cited references because Claim 9 defines the specific relationships between the coefficients of expansion in combination with the structure of amended Claim 8. Applicants respectfully submit that Claim 9 is allowable, and Applicants respectfully request the Examiner to withdraw the rejection of Claim 9 under 35 U.S.C. § 103(a).

Claim 10

Claim 10 depends from Claim 8 and further defines the coefficient of expansion of the synthetic resin as being less than the coefficient of expansion of the land and greater than the coefficient of expansion of the substrate. Claim 10 is patentably distinguished over the cited references for at least the reasons set forth above with respect to amended Claim 10. Claim 10 is further patentably distinguished over the cited references because Claim 10 defines the specific relationships between the coefficients of expansion in combination with the structure of amended Claim 8. Applicants respectfully submit that Claim 10 is allowable, and Applicants respectfully request the Examiner to withdraw the rejection of Claim 10 under 35 U.S.C. § 103(a).

Appl. No. : 10/022,297

Filed : December 12, 2001

Response to the Rejection of Claims 2-5, 11 and 12 Under 35 U.S.C. § 103(a) in Section 11 of the Office Action

In Section 11 of the Office Action, the Examiner rejects Claims 3-5, 11 and 12 under 35 U.S.C. § 103(a) as obvious over U.S. Patent No. 5,373,190 to Ichiyama in view of Japanese Patent No. JP406275942A to Sakuma and U.S. Patent No. 5,969,426 to Baba et al.

Applicants have cancelled Claim 3 and have amended Claim 4. Applicants respectfully traverse the rejection of amended Claim 4 and Claims 5, 11 and 12 for the following reasons.

Claim 4

Claim 4 originally depended from Claim 3, which depended from Claim 1. Claim 4 is amended herein to include elements from original Claim 1 and from original Claim 3 as well as from original Claim 4. Amended Claim 4 recites a semiconductor device comprising a substrate. The substrate comprises aluminum. A land is formed on the substrate. A semiconductor chip is mounted on the land. The semiconductor chip is joined with the land only through a solder layer. A synthetic resin covers the land, the solder layer and the semiconductor chip on the substrate. The synthetic resin has a coefficient of expansion of the synthetic resin that is generally less than a coefficient of expansion of aluminum.

Neither Ichiyama, Sakuma nor Baba et al. discloses a coefficient of expansion of the synthetic resin being generally less than a coefficient of expansion of aluminum. Accordingly, the combination of Ichiyama, Sakuma and Baba et al. does not teach or suggest a coefficient of expansion of the synthetic resin being generally less than a coefficient of expansion of aluminum.

The Examiner asserts that the limitation of "a coefficient of expansion of the synthetic resin being generally less than a coefficient of expansion of aluminum" makes Claim 4 a product-by-process claim.

Applicants respectfully disagree with the Examiner's characterization of amended Claim 4 as a product-by-process claim. In particular, the limitation cited by the Examiner does not define a process. Rather, the limitation defines physical properties of the synthetic resin and the aluminum substrate that together define a combined structure that is patentably distinguished

Appl. No. : 10/022,297
Filed : December 12, 2001

over the cited references. Applicants respectfully submit that amended Claim 4 is allowable, and Applicants respectfully request the Examiner to withdraw the rejection of amended Claim 4 under 35 U.S.C. § 103(a).

Claim 5

Claim 5 depends from Claim 4 and further defines the synthetic resin as having a coefficient of linear expansion that is generally less than approximately 23 ppm/°K. Claim 5 is patentably distinguished over the cited references for at least the reasons set forth above with respect to amended Claim 4. Claim 5 is further patentably distinguished over the cited references because Claim 5 defines a further structural limitation on the value of the coefficient of expansion of the synthetic resin. Applicants respectfully submit that Claim 5 is allowable, and Applicants respectfully request the Examiner to withdraw the rejection of Claim 5 under 35 U.S.C. § 103(a).

Claims 11 and 12

Claims 11 and 12 depend from Claim 8 and further define the invention defined in amended Claim 8. Claims 11 and 12 are patentably distinguished over the cited references for at least the reasons set forth above with respect to amended Claim 8. Claims 11 and 12 are further distinguished over the cited references because each claim defines a further structural limitation in combination with the limitations of amended Claim 8. Applicants respectfully submit that Claims 11 and 12 are allowable, and Applicants respectfully request the Examiner to withdraw the rejection of Claims 11 and 12 under 35 U.S.C. § 103(a).

Response to the Rejection of Claim 6 Under 35 U.S.C. § 103(a) in Section 12 of the Office Action

In Section 12 of the Office Action, the Examiner rejects Claim 6 under 35 U.S.C. § 103(a) as obvious over U.S. Patent No. 5,373,190 to Ichiyama in view of Japanese Patent No. JP406275942A to Sakuma, U.S. Patent No. 5,969,426 to Baba et al., and U.S. Patent No. 5,844,305 to Shin et al.

Appl. No. : 10/022,297
Filed : December 12, 2001

Claim 6 is amended herein to depend from amended Claim 4. Applicants respectfully traverse the rejection of amended Claim 6. Amended Claim 6 is patentably distinguished over the cited references for at least the reasons set forth above with respect to amended Claim 4. Amended Claim 6 is further patentably distinguished over the cited references because Claim 6 defines a further structural limitation of the land of Claim 4. Applicants respectfully submit that amended Claim 6 is allowable, and Applicants respectfully request the Examiner to withdraw the rejection of amended Claim 6 under 35 U.S.C. § 103(a).

Response to the Rejection of Claim 7 Under 35 U.S.C. § 103(a) in Section 13 of the Office Action

In Section 13 of the Office Action, the Examiner rejects Claim 7 under 35 U.S.C. § 103(a) as obvious over U.S. Patent No. 5,373,190 to Ichiyama in view of Japanese Patent No. JP406275942A to Sakuma, U.S. Patent No. 5,969,426 to Baba et al. and Japanese Publication No. JP53143656A to Nippon.

Claim 7 is amended herein to depend from amended Claim 4. Amended Claim 7 is patentably distinguished over the cited references for at least the reasons set forth above with respect to amended Claim 4. Amended Claim 7 is further patentably distinguished over the cited references because amended Claim 7 defines a further structural limitation of the synthetic resin of Claim 4. Applicants respectfully submit that amended Claim 7 is allowable, and Applicants respectfully request the Examiner to withdraw the rejection of amended Claim 7 under 35 U.S.C. § 103(a).

Response to the Rejection of Claims 14 and 15 Under 35 U.S.C. § 103(a) in Section 14 of the Office Action

In Section 14 of the Office Action, the Examiner rejects Claim 14 and 15 under 35 U.S.C. § 103(a) as obvious over U.S. Patent No. 5,373,190 to Ichiyama in view of Japanese Patent No. JP406275942A to Sakuma and Japanese Patent No. JP02000253570A to Yamanashi.

Claims 14 and 15 depend from amended Claim 1 and further define the invention defined in amended Claim 1. Claims 14 and 15 are patentably distinguished over the cited references for

Appl. No. : 10/022,297
Filed : December 12, 2001

at least the reasons set forth above with respect to amended Claim 1. Claims 14 and 15 are further distinguished over the cited references because each claim defines an additional feature in combination with the limitations of amended Claim 1. Applicants respectfully submit that Claims 14 and 15 are allowable, and Applicants respectfully request the Examiner to withdraw the rejection of Claims 14 and 15 under 35 U.S.C. § 103(a).

Response to the Rejection of Claims 16-24 and 26 Under 35 U.S.C. § 103(a) in Section 15 of the Office Action

In Section 15 of the Office Action, the Examiner rejects Claims 16-24 and 26 under 35 U.S.C. § 103(a) as obvious over Japanese Patent No. JP411219981A to Ujiie et al. Applicants respectfully traverse the rejection of Claims 16-24 and 26 for the following reasons.

Claim 16

Claim 16 recites a semiconductor device that comprises a substrate. A land is formed on the substrate, and a semiconductor chip is mounted on the land. The semiconductor chip is joined with the land by a solder layer. The semiconductor chip defines at least two corners that are positioned generally opposite to each other. The land defines at least two corners disposed in proximity to the corners of the semiconductor chip, and the corners of the land generally confine the corners of the semiconductor chip therein.

Figure 10 of Ujiie et al. discloses a relatively large size semiconductor chip 1 mounted on at least two lands 2a. In other words, the semiconductor chip 1 is larger than each land 2a. Accordingly, Ujiie fails to teach or suggest that the corners of the land generally confine the corners of the semiconductor chip therein as defined in Claim 16. Applicants respectfully submit that Claim 16 is patentably distinguished over Ujiie et al., and Applicants respectfully request the Examiner to withdraw the rejection of Claim 16 under 35 U.S.C. § 103(a).

Claims 17-24 and 26

Claims 17-24 and 26 depend from Claim 16 and further define structural features of the invention defined in Claim 16. Claims 17-24 and 26 are patentably distinguished over Ujiie et al.

Appl. No. : 10/022,297
Filed : December 12, 2001

for at least the reasons set forth above with respect to Claim 16. 17-24 and 26 are further distinguished over Ujiie et al. because each claim defines an additional feature in combination with the limitations of Claim 16. Applicants respectfully submit that Claims 17-24 and 26 are allowable, and Applicants respectfully request the Examiner to withdraw the rejection of Claims 17-24 and 26 under 35 U.S.C. § 103(a).

Response to the Rejection of Claim 25 Under 35 U.S.C. § 103(a) in Section 16 of the Office Action

In Section 16 of the Office Action, the Examiner rejects Claim 25 under 35 U.S.C. § 103(a) as obvious over Japanese Patent No. JP411219981A to Ujiie et al in view of Japanese Patent No. JP02000253570A to Yamanashi. Applicants respectfully traverse the rejection of Claim 25.

Claim 25 depends from Claim 16 and further define the invention defined in Claim 16. Claim 25 is patentably distinguished over the cited references for at least the reasons set forth above with respect to Claim 16. Claim 25 is further distinguished over the cited references because Claim 25 defines additional features in combination with the limitations of Claim 16. Applicants respectfully submit that Claim 25 is allowable, and Applicants respectfully request the Examiner to withdraw the rejection of Claim 25 under 35 U.S.C. § 103(a).

Summary

Applicants respectfully request the Examiner to withdraw objections to the drawings and the specification in view of the accompanying drawing correction, the foregoing amendments and the supporting arguments. Applicants further respectfully request the Examiner to withdraw the rejections of Claims 1 and 4-26 under 35 U.S.C. § 112, second paragraph, and under 35 U.S.C. § 103(a). Applicants respectfully submit that Claims 1 and 4-26 are now in condition for allowance, and Applicants respectfully request allowance of Claims 1 and 4-26.

Appl. No. : 10/022,297

Filed : December 12, 2001

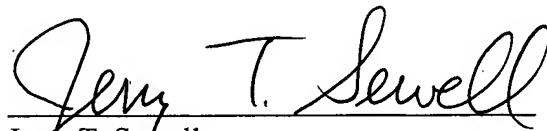
Request for Telephone Interview

If there are any impediments to the prompt allowance of this application or if there are any questions or issues that may be resolved via a telephone interview, Applicants invite the Examiner to call the undersigned attorney of record at 949-721-2849 (direct) or at the general office telephone number listed below.

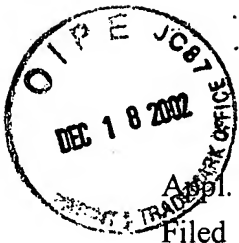
Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: December 12, 2002

By: 
Jerry T. Sewell
Registration No. 31,567
Attorney of Record
2040 Main Street
Fourteenth Floor
Irvine, California 92614
949-760-0404

JTS-16122.DOC
20021212/4



App. No. : 10/022,297
Filed : December 12, 2001

***VERSION OF SPECIFICATION WITH MARKINGS TO
SHOW MODIFICATIONS UNDER 37 C.F.R. §§ 1.121(b)(iii)***

The changes made to the specification in the current amendment are shown below. Insertions appear as underlined text (e.g., insertions) and deletions appear as bold text surrounded by brackets (e.g., **[deletions]**).

IN THE SPECIFICATION:

On pages 7-8, replace paragraph [0047] with the following paragraph:

[0047] As shown in FIGURES 9 and 10, the terminal bar 62A, for example, preferably comprises copper plate and is shaped generally as an S-configuration. The terminal bar 62A comprises a bottom horizontal section 96A, a vertical section 98A and a top horizontal section 100A. The bottom section 96A preferably defines two apertures 102A. The printed wiring board 72 also defines two apertures 103A (FIGURE [5] 4) corresponding to the apertures 102A of the bar 62A. The rivets 94 pass through the apertures to couple the bottom section 96A with the printed wiring board 72. The vertical section 98A defines an aperture 104A. The top section 100A defines an aperture 105A. The terminal bar 62B preferably comprises the same material, is shaped in substantially the same configuration, and has similar apertures. Since the terminal bar 62B is similar to the terminal bar 62A except for its size and except for the positions of the apertures, the same reference numerals are assigned to corresponding portions of the terminal bar 62B but with the letter B. Because the sizes of the respective terminal bars 62A, 62B and the positions of the apertures 104A, **[104B,]** 105A, 105B are shown in FIGURES 6-**[8]** 10, further descriptions about the sizes and the positions are not deemed necessary. Note that the bottom apertures (not shown) of the terminal bar 62B are positioned to match the apertures 103B in FIGURE [5] 4.

Appl. No. : 10/022,297

Filed : December 12, 2001

On page 8, replace paragraph [0048] with the following paragraph:

[0048] The capacitor 64 has a pair of terminals [106] 106A, 106B that are disposed on the same side and are formed with threaded holes. Two bolts [108] 108A, 108B are fitted into the apertures 104A, 104B of the respective terminal bars 62A, 62B and are further fitted into the threaded holes of the terminals [106] 106A, 106B. Thus, the vertical sections 98A, 98B of the terminal bars 62A, 62B together support the capacitor 64. A pair of power cables can be connected with the respective apertures 105A, 105B to couple the terminal bars 62A, 62B with the battery 58.

On page 8, replace paragraph [0049] with the following paragraph:

[0049] Another terminal bar 62C, which is similar to the terminal bars 62A, 62B, is affixed to the printed wiring board 72 below the circuit board 88. Although the terminal bar 62C only has a nominal vertical section and no aperture is provided in the vertical section, the same reference numerals are assigned to the corresponding portions but with the letter C. Note that the bottom apertures (not shown) of the terminal bar 62C are positioned to match the [aperture] apertures 103C in FIGURE [5] 4. The terminal bar 62C is connected with the drains D of the FETs 66. A power cable can be connected with the aperture 105C to couple the terminal bar 62C with the motor 54.

On pages 14-15, replace paragraph [0071] with the following paragraph:

[0071] FIGURES 22-26 illustrate a further method using the reflow furnace and a mounting tool. As shown in FIGURE 22, at a step S31, the part mounter mounts parts 160 onto each predetermined location on the substrate 72 as shown in FIGURES 23-25. The cream solder 146 is previously applied at the respective portions of the parts which are soldered. At a next step S32, a mounting tool 162

Appl. No. : 10/022,297

Filed : December 12, 2001

is set for positioning the semiconductor chips 66 at predetermined locations. The tool 162 has windows 164 through which the semiconductor chips 66 can be mounted. The chip mounter, at [the] a step [S32] S33, mounts the semiconductor chips 66 onto the cream solder 146 applied on the lands 144 through the windows 164. Weights 166 are placed on the respective semiconductor chips 66. At a step S34, the substrate 72 with the semiconductor chips 66 and the parts 160 are put in the reflow furnace to fix to the substrate 72 by the hot blast. In this step S34, the tool 162 advantageously prevents the semiconductor chips 66 from slipping off the preset positions. The weights also are useful to prevent voids from being generated in the solder 146 or to expedite the bubbles to escape from the solder 146 in the step S34. At a last step S35, the tool 162 and the weights 166 are detached.



Appl. No. : 10/022,297
Filed : December 12, 2001

***VERSION OF CLAIMS WITH MARKINGS TO SHOW
MODIFICATIONS UNDER 37 C.F.R. §§ 1.121(c)(ii)***

IN THE CLAIMS:

Claims 1, 4 and 6-8 are amended herein as follows:

1. (Amended) A semiconductor device comprising a substrate, a land formed on the substrate, a semiconductor chip mounted on the land, a solder layer only through which the semiconductor chip is joined with the land, and a synthetic resin covering the land, the solder layer and the semiconductor chip on the substrate, a coefficient of expansion of the synthetic resin being generally less than a coefficient of expansion of the substrate or a coefficient of expansion of the land.

4. (Amended) **[The] A** semiconductor device **[as set forth in Claim 3, wherein]** comprising a substrate, the substrate comprising aluminum, a land formed on the substrate, a semiconductor chip mounted on the land, a solder layer only through which the semiconductor chip is joined with the land, and a synthetic resin covering the land, the solder layer and the semiconductor chip on the substrate, a coefficient of expansion of the synthetic resin **[is]** being generally less than a coefficient of expansion of aluminum.

6. (Amended) The semiconductor device as set forth in Claim **[3]** 4, wherein the land comprises copper.

7. (Amended) The semiconductor device as set forth in Claim **[3]** 4, wherein the synthetic resin includes epoxide.

Appl. No. : 10/022,297

Filed : December 12, 2001

8. (Amended) [The] A semiconductor device [as set forth in Claim 1, wherein] comprising a substrate, a land formed on the substrate, a semiconductor chip mounted on the land, a solder layer only through which the semiconductor chip is joined with the land, and a synthetic resin covering the land, the solder layer and the semiconductor chip on the substrate, a coefficient of expansion of the synthetic resin [is] being generally less than one of a coefficient of expansion of the substrate and a coefficient of expansion of the land, and [is] being generally greater than the other one of the coefficient of expansion of the substrate and the coefficient of expansion of the land.

JTS-16122.DOC
20021212/4